April 7, 1999

Rusty Pipes
Director, Coolwater Municipal Water Supply
119 N. Water Plant Drive
Coolwater, IA 55555

Dear Ms. Pipes:

In 1998, the Iowa Department of Natural Resources (IDNR) initiated a Source Water Protection program. Source Water Protection is an effort to protect public drinking water supplies from contamination, and the program is designed to provide you with the initial information needed to begin protecting your drinking water source. We hope the program will help initiate a dialog, both within your community and with IDNR staff, about your water supply and possible measures to protect it.

The initial phase of Source Water Protection involves delineating the zones that supply groundwater to public water supply wells. Existing hydrogeologic and well data are used to estimate how quickly water groundwater travels through its aquifer to reach your well. An inventory and evaluation of known potential sources of contamination, and a determination of your supply's susceptibility to these contamination sources are also part of this assessment. The reporting of this information to public water suppliers is required by amendments to the 1996 Safe Drinking Water Act, and the work is funded by a grant from the Environmental Protection Agency.

The enclosed documents describe the source water zones identified for Coolwater's wells, how they were delineated, the vulnerability of Coolwater's wells to contamination, and the locations of known potential contaminant sources in the area. A relative ranking of the risk posed by the potential contaminant sources to Coolwater's wells is also included.

The delineations and contaminant source inventory for Coolwater can be improved by community efforts. The enclosed documents suggest how such improvements can be made. In addition, a copy of the state Source Water Protection Plan that provides details on implementing source water protection efforts locally is enclosed. Within the upcoming month, we will schedule two public meetings in northwest Iowa to provide further explanation of the attached information. Dates, times and locations will be sent to you as soon as they are available. We encourage you to review the reports for Coolwater, and to consider what kinds of protection activities would be appropriate for Coolwater. We hope you will be able to attend one of the upcoming meetings. Please contact us with any questions or for assistance with your efforts.

Sincerely,

Dennis Alt
Water Supply Section
515/281-8998

Robert D. Libra
Geological Survey Bureau
319/335-5159

Source Water Protection Evaluation for Coolwater

Source Water Delineation

The enclosed map titled "Coolwater – Source Water Protection Area" shows our estimate of the source area for your water supply wells. This is the area most directly linked to your water supply, and activities in this area are most likely to influence the quality of your water. The source area is divided to show the areas we estimate groundwater flows through during 2-, 5-, and 10-year periods on its way to your wells. Since Coolwater's wells are located quite close together and draw water from the same aquifer, a single set of zones is given for the wells. These "time-of-travel" zones are imperfect, but were calculated using available historical information. In addition to the groundwater time-of-travel zones, the map also shows the 2- and 5-year surface runoff areas that are uphill from the 2-and 5-year time-of-travel zones. Contaminant releases in these surface runoff areas have the potential to run downhill through gullies or existing drainage tiles and infiltrate the aquifer below the ground surface. The IDNR recommends that at a minimum, a two-year time of travel be used for protection from pathogens. A minimum 5-year time of travel is recommended for protection from chemical contaminants.

The time-of-travel zones for Coolwater were estimated using a computer model developed by the Environmental Protection Agency. The model requires certain input data, some of which are estimated or assumed. The technical details are summarized below:

1. Coolwater uses two wells, #1 and #2, to pump an average of 100,000 gallons/day. The pumpage was divided equally between these wells. Information on pumpage was provided by Coolwater.

2. The Maple River and Battle Creek alluvial aquifers provide water to Coolwater's wells. Alluvial aquifers occupy river valleys and are typically composed of layers of sand and gravel. The Maple River and Battle Creek alluvial aquifers are assumed to have an average transmissivity (ability to transmit groundwater) of 7900 $feet^2$/day, a saturated thickness of 30 feet, and a porosity of 25%. The transmissivity was estimated from specific capacity tests on Coolwater well #2.

3. Natural groundwater flow directions are an important factor in delineating source water protection zones. Numerous measurements of water table elevations are necessary to determine the direction of groundwater flow, and these were not available for your area. In Coolwater, groundwater is estimated to flow in a direction parallel to the valleys of the Maple River and Battle Creek.

4. The slope of the water table provides the driving force that moves groundwater. For Coolwater, the slope was estimated to equal to the land surface slope of the river valley.

5. Alluvial aquifers have physical and hydrologic limits, or boundaries. For Coolwater, the extent of sandy soils and the location of the valley walls were used to define the limits of

the aquifer. The Maple River is assumed to be a boundary, meaning that there is little or no groundwater flow beneath the river. It was assumed that Battle Creek may not be a significant boundary, meaning that groundwater may flow under the creek and move towards Coolwater's wells.

It is important to emphasize that the source zones for Coolwater are best estimates based on available data. These zones could be refined, and in all probability made smaller, if additional information was available. This information would include additional detailed estimates of the aquifer transmissivity, which could be obtained by performing pump tests on your wells. In particular, measurements of water table elevations would be very useful. These would be obtained by installing shallow monitoring wells at appropriate locations and carefully surveying the wells to a common elevation point. If Coolwater is interested in improving the definition of the source water zones, feel free to contact and discuss possible approaches with Geological Survey Bureau staff.

Contaminant Source Inventory

The delineation map shows the potential contamination sources identified within or near Coolwater's source water protection areas. The databases used for the inventory are described in Table 1 of the Source Water Protection Plan. This inventory includes facilities and land uses utilizing materials that may result in groundwater contamination if they are released to the environment. Information about these facilities, including a ranking of relative risks, is included on the accompanying table, "Potential Contaminant Sources and Susceptibility Analysis for Wells #1 and #2".

In addition to the individual "point" sources listed in the table, "nonpoint" sources of contamination also exist in your source water zones. In Iowa, a significant potential nonpoint source of contamination is row crop agriculture. While we do not have annual land use summaries for the state, land use for 1992 is available to describe the typical intensity of row cropping in your source areas. These are given below:

2-Year Time of Travel Zone	57% Row Crop
5-Year Time of Travel Zone	86% Row Crop
10-Year Time of Travel Zone	83% Row Crop
2-Year Watershed Runoff Area	71% Row Crop
5-Year Watershed Runoff Area	68% Row Crop

Not all potential contaminant sources are known to us or have been accurately located and recorded in our databases. As a result, some potential sources may be located inaccurately or not included in the inventory. The Source Water Protection Plan provides listings of additional types of facilities and land use that may result in contamination, and describes how community-based inventories can be successfully carried out. We encourage you review the attached materials and consider using your knowledge of the community to improve the contaminant source inventory.

Susceptibility Analysis

Susceptibility is a relative measure of risk. In the attached table, "Potential Contaminant Sources and Susceptibility Analysis for Wells #1 and #2," the factors affecting susceptibility are shown and assigned numerical values. The relative risk is based upon:

1. The general potential for different classes of facilities or land uses to release "environmentally mobile contaminants";
2. The time-of-travel zone the facility is located in; and
3. The vulnerability of the aquifer to contamination.

The overall or "Cumulative Risk" is the result of adding these three factors, and is given in the far right column of the table. Scores can range from 3 to 12; potential contaminant sources with a score of 3 would have a relatively low chance of reaching Coolwater's wells, while contaminants with a score of 12 would have a relatively high risk of impacting the system's wells. Further explanation of this ranking is given in the Source Water Plan.

The goal of the susceptibility analysis is to provide systems with a list to help them in prioritizing potential risks so they can be addressed through management strategies. During the development of a source water protection plan, though, it is up to the local community to decide which potential contaminant sources carry the most risk since many potential contaminant sources use some form of best management practice to reduce the possible risk of contamination. The risk rankings provided in this report are only a guide; the final decision on the priority of potential contaminant sources rests with the local source water protection team.

Alluvial aquifers like the one used by Coolwater are highly susceptible to contamination from society's land surface activities. Infiltrating water, and any contaminants carried by the water, move readily into alluvial aquifers because they are not overlain by slowly permeable materials (confining beds) that would act as a natural protective cover. Therefore, Coolwater's wells are classified as "Highly Susceptible to Contamination".

The activities at the top of the Coolwater susceptibility ranking include Dry Cleaners, Industrial Sites, Gas Stations, and Municipal Wastewater Dischargers. This information was obtained from existing current and historical databases, and is unverified. It is important that your community verify this information and record any additional potential contamination sources within your source water protection area during the development of your community source water protection plan. Should you locate additional potential contaminant sources, please notify IDNR so that your records can be updated.

Consumer Confidence Language

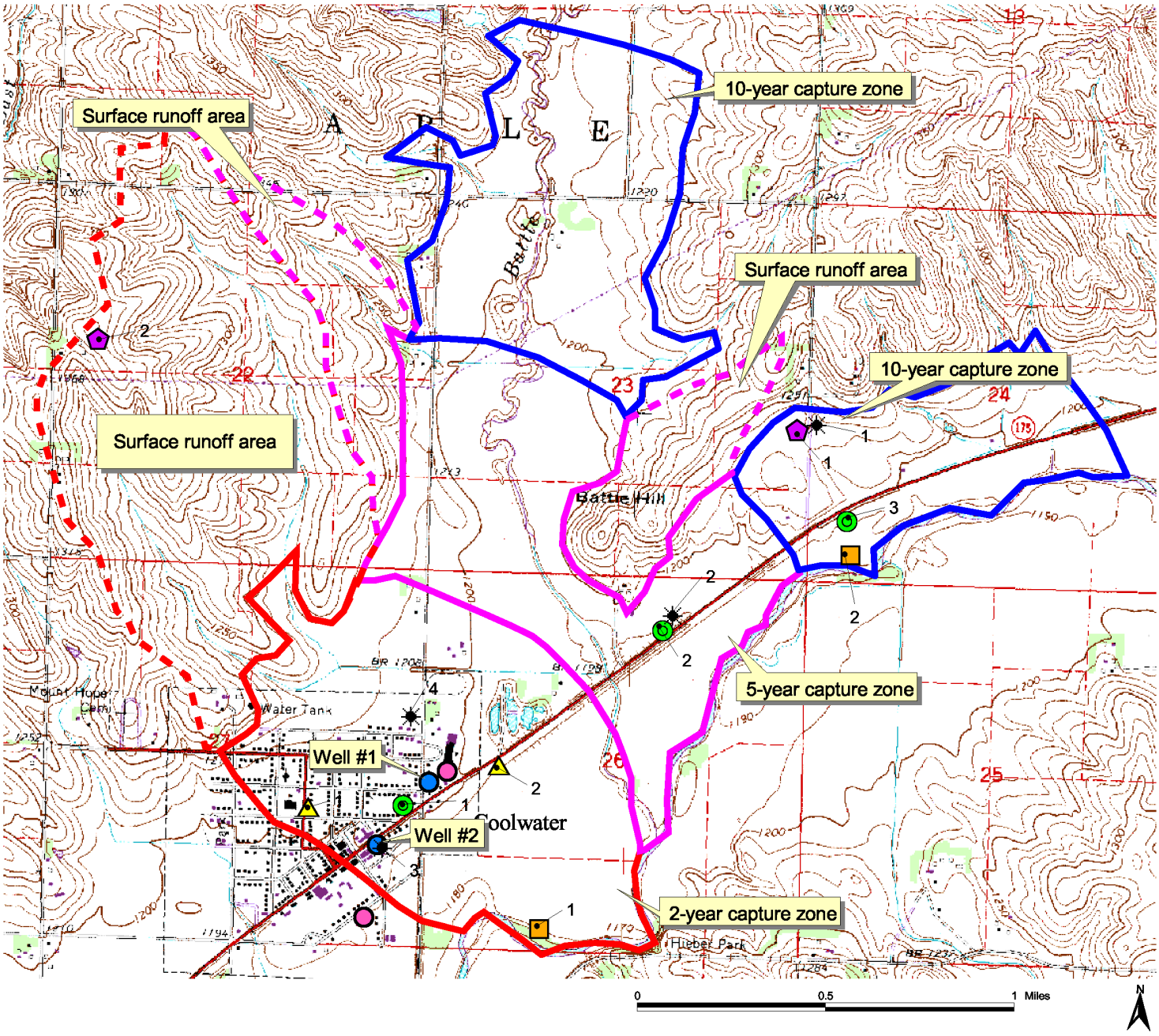
As the agency responsible for conducting drinking water programs in the state of Iowa, IDNR must provide each public water supply with language to be included in their Consumer Confidence Report. The following language, at a minimum, must be included in each Consumer Confidence Report you produce from now on:

"The Coolwater Municipal Water Supply obtains its water from the Maple River and Battle Creek alluvial aquifers. These alluvial aquifers are highly susceptible to contamination because

contaminants can move through them fairly quickly. Coolwater's wells will be most susceptible to things such as Dry Cleaners, Industrial Sites, Gas Stations, and Municipal Wastewater Dischargers. A detailed evaluation of your source water was completed by the Iowa Department of Natural Resources, and is available from (Insert Local Water Supply Name or Designee here) at (Insert Telephone Number of Local Water Supply or Designee here)."

You may modify this language or include additional information if you so desire, but you must identify the source of your system's drinking water and identify known sources of potential contamination.

Coolwater - Source Water Protection Area
Alluvial Wells



Source Water Protection Area

Coolwater municipal water supply wells

- Alluvial wells used in delineation
- not used

Source water protection area delineation zones

- 2-Year capture zone
- 5-Year capture zone
- 10-Year capture zone
- 2-Year watershed
- 5-Year watershed

Potential Contaminant Sources

- Other wells not used in delineation
- Underground storage tank sites
- Hazardous waste generators (RCRA permits)
- Wastewater treatment facilities
- Permitted confinement livestock operations

Potential Contaminant Sources and Susceptibility Analysis for Coolwater Wells #1 and #2

	Column 1	Column 2		Column 3		Column 4		Column 5
No. on map	**Potential Contaminant Source**	**Land use type**	*Land use risk*	**Capture Zone**	*Zone risk*	**Aquifer Vul.**	Aquifer risk	***Risk score***
		Score Range 1-5 (Table 3 in Source Water Protection Plan)		2-year/fixed radius=3 5-year = 2 10-year/watershed=1		Score Range 1-4 (Table 4 in Source Water Protection		*Sum of Columns 2-4*
	RCRA permits							
1	Sunshine Dry Cleaner	Retail commercial: dry cleaner	*5*	2-year	*3*	very high	4	*12*
2	Acme Electronics	Industrial: all manufacturing	*5*	2-year	*3*	very high	4	*12*
Underground Storage Tanks								
1	Casey's	Retail commercial:gasoline	*5*	2-year	*3*	very high	4	*12*
2	Coolwater Gas n' Stuf	Retail commercial:gasoline	*5*	5-year	*2*	very high	4	*11*
3	Ida Farmer's Coop	Retail commercial:gasoline, fuel oil distributors	*5*	10-year	*1*	very high	4	*10*
Waste Water Treatment Sites								
1	City of Coolwater	Waste disposal	*5*	2-year	*3*	very high	4	*12*
2	Ida Packing Co.	Waste disposal	*5*	2-year	*3*	very high	4	*12*
Confined Animal Feeding Operations								
1	Mega Farms	Commercial use: confined animal feeding operatio	*4*	10-year	*1*	very high	4	*9*
2	John Smith	Commercial use: confined animal feeding operatio	*4*	watershed	*1*	very high	4	*9*